EXHIBIT 15

EXHIBIT 15 – CLAIM CHART FOR U.S. PATENT 9,667,337

Claim 1	Accused Hotspot Devices[1]	Accused RAN Products[2]
[1PRE] A broadband wireless repeater or relay, comprising:	Accused Hotspot Devices, such as smartphones, (e.g., Galaxy S20-S25, Galaxy Z Flip 3-6, Galaxy Z Fold 2-6, Galaxy Note 20 Ultra, and Galaxy Series A smartphones), tablets (e.g., Galaxy Tab S series tablets), Hospitality TVs (e.g., NJ670, NT670, NJ678, NT678, NJ690, NT690, NC890, HQ60A), and smart hub devices (e.g., SmartThings Wifi, SmartThings Hub, Connect Home, Connect Home Pro), can serve as a broadband wireless repeater when in a mode to operate as a mobile hotspot. So configured, the Accused Hotspot Devices connect one or more mobile devices via a Wi-Fi network to the Internet or via a cellular network to the Internet. See Samsung website (www.samsung.com/us/support/answer/ANS00079036/) explaining how to use a mobile hotspot on a Galaxy phone or tablet. 	Accused RAN Products (e.g., Massive MIMO Radios, CBRS radios, Compact Macros, and Link Cells) act as a wireless repeater to broadcast received wireless signals to connected devices via, for example, a 5G cellular network, and to receive and forward wireless signals received from the connected devices to the Internet via a 5G cellular network. Massive MIMO Radio: See www.samsung.com/global/business/networks/products/radio-access/massive-mimo-radio/ Citizens Broadband Radio Service (CBRS) Radios enable communication of 150MHz of shared spectrum in Band 48 (otherwise known as the 3.5GHz C-Band). See https://insights.samsung.com/2022/11/04/what-is-cbrs-and-how-is-it-transforming-enterprise-networks-2/ and https://www.samsung.com/global/business/networks/products/radio-access/cbrs/ Compact Macro: See networks/insights/brochures/1221-5g-fixed-wireless-access-a-powerful-alternative-to-fiber-to-the-home/5g-fixed-wireless-access-a-powerful-alternative-to-fiber-to-the-home.pdf 5G Link Cell: See images.samsung.com/is/content/samsung/assets/global/busi

[1] Upon information and belief, all Accused Hotspot Devices function in a substantially similar manner for the relevant accused functionality.

[2] Upon information and belief, all Accused RAN Products function in a substantially similar manner for the relevant accused functionality.

Ex. 15, p. 1

319834411.4

EXHIBIT 15 – CLAIM CHART FOR U.S. PATENT 9,667,337

		ness/networks/insights/white-papers/bringing-5g-indoors-the-cricital-next-step-in-5gs-evolution/Samsung-Link-Series.pdf
[1A] at least one receiver or transceiver for signal or data reception from one or more devices;	The Accused Hotspot Devices include a receiver or transceiver for signal or data reception from a device ("connected device") that is connected wirelessly to the Accused Hotspot Device via WiFi5, WiF6 or WiF6E. The "at least one receiver" comprises the WiFi receiver of the Accused Hotspot Devices. Below is an image of a Galaxy S20 Ultra circuit board, showing in the orange rectangle, a Murata KM9D19075 Wi-Fi module, which comprises "at least one receiver or transceiver for signal or data reception from one or more devices." See www.ifixit.com/Teardown/Samsung+Galaxy+S20+Ultra+Teardown/131607?srsltid=AfmBOorbKmG1FgZYkgqQsKc3mMYaHd6vA_c9nDDoDhWlkT_IkjlHRT-t	The Accused RAN Products include radio chipsets, which comprise at least one receiver or transceiver for signal or data reception from a connected device. See (www.samsung.com/global/business/networks/insights/press-release/0621-samsung-unveils-new-chipsets-to-enhance-next-generation-5g-ran-portfolio/)

EXHIBIT 15 – CLAIM CHART FOR U.S. PATENT 9,667,337
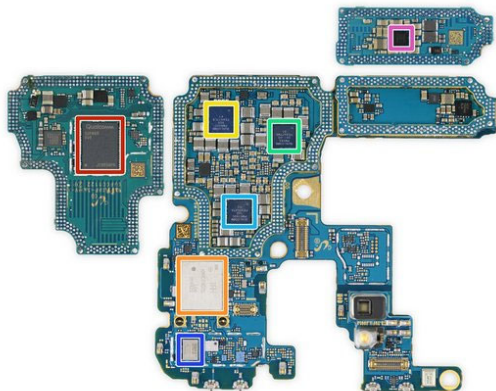
As another example, below is an image of a Galaxy S22 Ultra circuit board a Broadcom Wi-Fi 6/6E chip, which comprises "at least one receiver or transceiver for signal or data reception from one or more devices." See www.techinsights.com/blog/samsung-galaxy-s22-ultra-teardown
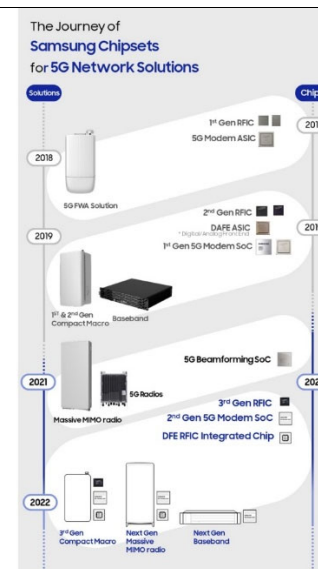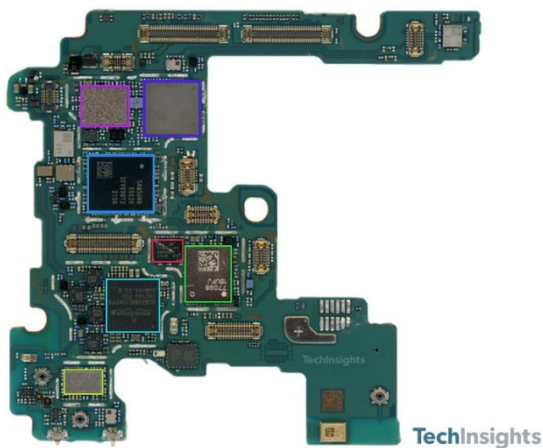

Ex. 15, p. 3

EXHIBIT 15 – CLAIM CHART FOR U.S. PATENT 9,667,337

Samsung's website describes the specification of the HQ60A series hospitality TVs as including a software access point (SoftAP). The SoftAP feature allows the Hospitality TV to deploy hotspot for the hotel guests to connect to the internet.

Samsung LYNK™ Cloud

Yes

Hospitality Plug&Play (Easy Set-up)

Yes

Hotel Channel List

Yes

Mixed Channel List (ATSC, DVB-T/T2/C/S2, Analog)

Yes

Energy Saving Mode (BLU Control)

Yes

Clock Back Up Supply

Yes

Soft AP

Yes

Samsung LYNK™ DRM

Yes

Security Mode

Yes

See

EXHIBIT 15 – CLAIM CHART FOR U.S. PATENT 9,667,337

	https://www.samsung.com/ca/business/commercial-tvs/hotel-tv/hq60a-4k-qled-hg65q60aanfxza/ As shown in the image below, Samsung's website describes the specifications of the HQ60A Series Hospitality TV as supporting the WiFi5 generation (i.e, IEEE 802.11ac). According to IEEE 802.11ac, the Accused Hotspot Device supports a channel width of up to 160 MHz and data transmission speeds of up to 6.93 Gbps. **USB** 2 x USB-A **Digital Audio Out (Optical)** 1 **Ex-Link (Supports RS-232C Gender)** Supports Stereo Jack to RS232 Adapter **Wifi** Yes (WiFi5) **Variable Audio Out** Yes **RJ12 (Side/Rear)** Yes See *id.*	

EXHIBIT 15 – CLAIM CHART FOR U.S. PATENT 9,667,337
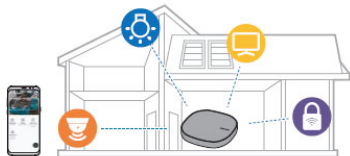
	In another example, the Accused Hotspot Devices (Connect Home Pro) can connect a user mobile device to other smart devices through a Wi-Fi network. This allows the Accused Hotspot Devices to send and receive wireless data over a Wi-Fi network. See https://content.syndigo.com/asset/17adf894-afac-49a6-9e43-acc47d706188/original.pdf **About SAMSUNG Connect Home (Pro)** The Samsung Connect Home (Pro) is a Wi-Fi router that can connect your smartphone to your smart home appliances via Wi-Fi. You can also connect Internet of Things (IoT) devices to this Wi-Fi hub via the Samsung SmartThings Hub feature. For larger homes, you can connect more Wi-Fi hubs.	
[1B] at least one transmitter or transceiver for signal or data transmission to one or more devices, wherein the transceiver for signal or data reception and the transceiver for signal or data	The Wi-Fi modules in the Accused Hotspot Devices comprise a transmitter or transceiver for signal or data transmission to the connected device, e.g., data received via the Accused Hotspot Device's 4G LTE or 5G connection, to the connected device. The Accused Hotspot Devices also include cellular (e.g., 4G LTE or 5G) modems for transmitting signals via a cellular network. For example, the S20 Ultra includes a Qualcomm SDX55M 2nd-gen 5G modem and the S22 Ultra includes a Samsung Exynos 2200 Application Processor and Modem. See https://www.ifixit.com/Teardown/Samsung+Galaxy+S20+Ult	The radio chipsets in the Accused RAN Products include comprise at least one transmitter or transceiver for signal or data transmission to the connected device. See (www.samsung.com/global/business/networks/insights/press-release/0621-samsung-unveils-new-chipsets-to-enhance-next-generation-5g-ran-portfolio/)

EXHIBIT 15 – CLAIM CHART FOR U.S. PATENT 9,667,337

transmission may be the same or different; and	ra+Teardown/131607?srsltid=AfmBOopOTcIPFaJiIRUPiDep 9-XATBYRH6xkMpaeDF27wAPov8Js8KhL and https://www.techinsights.com/blog/samsung-galaxy-s22-ultra-teardown In one example, the transmitted data is data that is received via the Accused Hotspot Device's 4G LTE or 5G network connection, and transmitted to the connected device (e.g., mobile user device). In another example, the image below shows that an Accused Hotspot Device (Q60A hospitality TV) uses at least a transmitter/receiver or a transceiver to establish wireless communication with a guest's mobile device, over WiFi5 generation (i.e., IEEE 802.11ac).	

EXHIBIT 15 – CLAIM CHART FOR U.S. PATENT 9,667,337

USB

2 x USB-A

Digital Audio Out (Optical)

1

Ex-Link (Supports RS-232C Gender)

Supports Stereo Jack to RS232 Adapter

Wifi

Yes (WiFi5)

Variable Audio Out

Yes

RJ12 (Side/Rear)

Yes

see https://www.samsung.com/ca/business/commercial-tvs/hotel-tv/hq60a-4k-qled-hg65q60aanfxza/

In another example, the Accused Hotspot Devices (Connect Home Pro) can connect a user mobile device to other smart devices through a Wi-Fi network. This allows the Accused Hotspot Devices to send and receive wireless data over a Wi-Fi network.

Ex. 15, p. 8

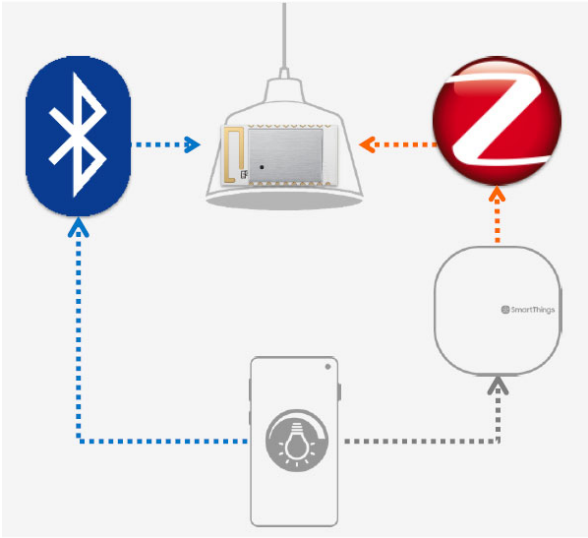**EXHIBIT 15 – CLAIM CHART FOR U.S. PATENT 9,667,337**

See

https://download.led.samsung.com/led/file/resource/2020/06/
Smart_Lighting_Solution_0602.pdf

| [1C] a controller that is configured or configurable for operation in one or more wireless networks, | The Accused Hotspot Devices comprise a controller that is configurable for operation in both a Wi-Fi network (e.g., Wi-Fi 5, 6, or 6E networks) and a cellular network (e.g., 4G LTE or 5G), which are wireless networks.

For example, the Galaxy S20 Ultra comprises, among other things, a STMicroelectronics STM32G071EB 32-bit ARM microcontroller and a Qualcomm SDX55M 5G modem. www.ifixit.com/Teardown/Samsung+Galaxy+S20+Ultra+Teardown/131607?srsltid=AfmBOorbKmG1FgZYkgqQsKc3mMYaHd6vA_c9nDDoDhWlkT_IkjlHRT-t | A processor in the Accused RAN products is configurable for operation in, for example, a 5G cellular network, which is a wireless network.

For example, the processor in the Accused RAN Products can be programmed with an ID for the connected device. The ID can be, for example, the IMEI (International Mobile Equipment Identity) number, the IMSI (International Mobile Subscriber Identity) number, the IP address, and/or the MAC address of the connected ultrawideband device. |

EXHIBIT 15 – CLAIM CHART FOR U.S. PATENT 9,667,337

In another example, the Galaxy S22 Ultra comprises, among other things, a Samsung RF Transceiver S5520, a Broadcom Front-End Module AFEM-9140, a Skyworks Front-End Module SKY58083-11, a Broadcom Wi-Fi 6/6E&BT 5.0 SoC BCM4389, and a Qorvo Front-End Module QM77098. www.techinsights.com/blog/samsung-galaxy-s22-ultra-teardown	The Accused RAN Products need the connected device's ID in order to communicate with the connected device via 5G.
	See amit-khandelwal.medium.com/understanding-5g-eab4a660d3ab;
Wi-Fi protocols, such a Wi-Fi 5, 6 and 6E, use IP and/or MAC addresses to identify connected devices. See e.g., www.techtarget.com/searchnetworking/answer/What-is-the-difference-between-an-IP-address-and-a-physical-address/.	interlir.com/2024/08/01/the-impact-of-5g-on-ip-resource-management/
The Accused Hotspot Devices utilize WPA2 and/or WPA3 protocols to allow for secure broadcasting of a WiFi hotspot, which employs a handshake sequence that requires identification via network information of devices requesting to join the mobile hotspot.	
https://insights.samsung.com/2022/12/16/how-to-turn-your-galaxy-smartphone-into-a-hotspot-3/	
https://en.wikipedia.org/wiki/Wi-Fi_Protected_Access	
The cellular modem in the Accused Hotspot Devices also configures the Accused Hotspot Devices for operation in a cellular network (e.g., 4G LTE or 5G).	
In another example, the image below shows that the Samsung operating system, Tizen, on Hospitality TVs is programable through a network API to configure the TVs network settings to identify an ultrawideband wireless device.	

Ex. 15, p. 10

EXHIBIT 15 – CLAIM CHART FOR U.S. PATENT 9,667,337

	NetworkManager (code listing)	
	See https://developer.samsung.com/smarttv/develop/api-references/samsung-product-api-references/network-api.html	
[1D] said controller communicating with said at least one receiver or transceiver for signal or data reception and said at least one transmitter or transceiver for signal or data transmission,	The controller in the Accused Hotspot Devices communicates with the receiver and transceiver of the Wi-Fi module and the cellular modem for data reception and transmission via Wi-Fi and cellular networks.	The controller in the Accused RAN Products communicates with the receiver and transceiver thereof for 5G data reception and transmission.
[1E] wherein at least one of said receiver or	Wi-Fi 5, 6 and 6E have channels with an instantaneous or overall occupied bandwidth of 100 MHz or more. For	The Accused RAN Products operate at 5G, which has NR bands that have a bandwidth of 100 MHz or more (e.g.,

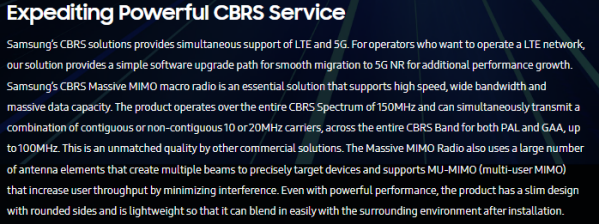**EXHIBIT 15 – CLAIM CHART FOR U.S. PATENT 9,667,337**

transceiver for signal or data reception and said transmitter or transceiver for signal or data transmission either or both transmit and receive at an instantaneous or overall occupied bandwidth of 100 MHz or more or have a data transmission rate of 100 Megabits per second or more,	example, Wi-Fi 5, 6 and 6E have channels with bandwidth of 160 MHz. See e.g., help.keenetic.com/hc/en-us/articles/360012060379-Available-channels-on-the-5-GHz-Wireless-network and help.keenetic.com/hc/en-us/articles/360010536300-What-you-need-to-know-about-Wi-Fi-6-IEEE-802-11ax The Accused Hotspot Devices also communicate via 4G LTE or 5G cellular networks, which have channels with an instantaneous or overall occupied bandwidth of 100 MHz or more. Aggregated 4G-LTE carrier channels, such as aggregated Band 41 channels, have a bandwidth of 100 MHz or more. 5G has several bands (including but not limited band n41, n48, n77, n78, n79, n90, n257, n258, n259, n260, n261) that have bandwidths of 100 MHz or more.	n41, n48, n77, n78, n79, n90, n257, n258, n259, n260, n261 bands). As described on Samsung's website, the Accused RAN Products, for CBRS Radios, "operate[s] over the entire CBRS Spectrum of 150MHz and can simultaneously transmit a combination of contiguous or non-contiguous 10 or 20MHz carriers, across the entire CBRS Band for both PAL and GAA, up to 100MHz." See https://www.samsung.com/global/business/networks/products/radio-access/cbrs/
[1F] wherein said broadband wireless repeater or relay is connected or connectable to one or more network	"one or more wireless networks" refer to WiFi networks provided by the Accused Hotspot Devices. "One or more network backbones" refer to internet connected to the backend of a cellular network (e.g., 4G-LTE or 5G) to which the Accused Hotspot Device is connected.	"one or more wireless networks" refer to cellular network (e.g., 4G-LTE or 5G) provided by the Accused RAN Products. "One or more network backbones" refer to computer networks connected and the 5G RAN via the wired connections.

EXHIBIT 15 – CLAIM CHART FOR U.S. PATENT 9,667,337

backbones for connecting said one or more wireless networks with said one or more network backbones,		
[1G] wherein said broadband wireless repeater or relay is used to support connectivity and/or position location capabilities for one or more mobile or portable devices, and	The Accused Hotspot Devices are "used to support connectivity" by providing internet protocol (IP) network connectivity for mobile devices connected via a WiFi hotspot to the Accused Hotspot Products.	The Accused RAN Products are "used to support connectivity" by providing IP network connectivity for mobile devices connected via the 5G RAN via the cellular network provided by the Accused RAN Products.
[1H] wherein said controller is configured or configurable to perform or for performing at least one of: a) ignore or filter out at	The Accused Hotspot Devices include a controller that performs elements (a) and (b). The controller performs element (a) by filtering out signals from undesired transmitters based on the ID of the device with which the repeater/relay is in Wi-Fi communication. For example, the Accused Hotspot Devices show the mobile user devices connected to the Wi-Fi network provided by the mobile hotspot. See e.g.,	The Accused RAN Products include a controller that performs elements (a) and (b). The controller performs element (a) by filtering out signals from undesired transmitters based on the ID of the device with which the repeater/relay communicates. The controller can be configured to perform element (b) by configuring network settings (e.g., whitelist, blacklist, firewall settings) of the Accused RAN Products to filter out wireless data transmissions (e.g., signals or data

EXHIBIT 15 – CLAIM CHART FOR U.S. PATENT 9,667,337

least some signal or data transmissions from one or more undesired transmitters, users, networks, data sources, or noise sources; and b) instruct one or more devices or networks to ignore or disregard at least some signal or data transmissions of one or more undesired transmitters, undesired users, undesired networks, or noise sources.	devices.vodafone.com.au/samsung/galaxy-s21-5g-android-11-0/connectivity/use-your-phone-as-wi-fi-hotspot/ The controller can be configured to perform element (b) by configuring network settings (e.g., whitelist, blacklist, firewall settings) of the Accused Hotspot Devices to filter out wireless data transmissions (e.g., signals or data communication) based on blocked (blacklisted) MAC addresses or source IP addresses. In another example, the Samsung developer documentation, for the Tizen Operating system, states "[t]he SoftAP module allows a device to act as a Soft Access Point (SoftAP), enabling other devices to connect to the network it creates. Applications can use this module to configure and monitor the SoftAP's status, manage network connectivity, and adjust security settings. It is primarily used in IoT environments to easily set up and maintain network access points." See https://docs.tizen.org/application/native/api/common/latest/group__CAPI__NETWORK__SOFTAP__MODULE.html The document below shows hardware and firmware configuration of an Accused Hotspot Devices, designed to protect wireless data communications. See https://download.led.samsung.com/led/file/resource/2020/06/Smart_Lighting_Solution_0602.pdf	communication) based on blocked (blacklisted) MAC addresses or source IP addresses.

Ex. 15, p. 14

EXHIBIT 15 – CLAIM CHART FOR U.S. PATENT 9,667,337

	SmartThings is built from the ground up to protect the device and users' data securely • Secure boot (SmartThings level 2 security) • H/W & F/W security (Protected external ports) • Protected storage / communication (AES-128 encryption) • Set-up mode / Proximity set-up • Compliance with CA SB-327	
Claim 17	**Accused Hotspots**	**Accused RAN Products**
[17] The broadband wireless repeater or relay of claim 1, wherein said repeater or relay employs MIMO or adaptive antenna technology.	The Accused Hotspot Devices use MIMO technology for both cellular and Wi-Fi connections. See e.g., https://r2.community.samsung.com/t5/Tech-Talk/What-is-4-4-MIMO-and-Does-My-Smartphone-Need-It/td-p/4938055;	The Accused RAN Products, including at least the Massive MIMO Radios, use MIMO technology. See www.samsung.com/global/business/networks/products/radio-access/massive-mimo-radio/
Claim 29	**Accused Hotspot Devices**	**Accused RAN Products**
[29PRE] A broadband wireless repeater or relay, comprising:	See claim element [1PRE] above.	See claim element [1PRE] above.

Ex. 15, p. 15

319834411.4

EXHIBIT 15 – CLAIM CHART FOR U.S. PATENT 9,667,337

[29A] at least one receiver or transceiver for signal or data reception from one or more devices;	See claim element [1A] above.	See claim element [1A] above.
[29B] at least one transmitter or transceiver for signal or data transmission to one or more devices, wherein the transceiver for signal or data reception and the transceiver for signal or data transmission may be the same or different; and	See claim element [1B] above.	See claim element [1B] above.
[29C] a controller that is configured or configurable for operation in	See claim elements [1C] and [1D] above.	See claim elements [1C] and [1D] above.

319834411.4

EXHIBIT 15 – CLAIM CHART FOR U.S. PATENT 9,667,337

one or more wireless networks, said controller communicating with said at least one receiver or transceiver for signal or data reception and said at least one transmitter or transceiver for signal or data transmission,		
[29D] wherein at least one of said receiver or transceiver for signal or data reception and said transmitter or transceiver for signal or data transmission either or both transmit and receive at an instantaneous	See claim element [1E] above.	See claim element [1E] above.

EXHIBIT 15 – CLAIM CHART FOR U.S. PATENT 9,667,337

or overall occupied bandwidth of 100 MHz or more or have a data transmission rate of 100 Megabits per second or more,		
[29E] wherein said repeater or relay employs MIMO or adaptive antenna technology,	The Accused Hotspot Devices use MIMO technology for both cellular and Wi-Fi connections. See e.g., https://r2.community.samsung.com/t5/Tech-Talk/What-is-4-4-MIMO-and-Does-My-Smartphone-Need-It/td-p/4938055;	The Accused RAN Products, including at least the Massive MIMO Radios use MIMO technology. See www.samsung.com/global/business/networks/products/radio-access/massive-mimo-radio/
[29F] wherein said broadband wireless repeater or relay is used to support connectivity and/or position location capabilities for one or more mobile or	See claim element [1G] above.	See claim element [1G] above.

Ex. 15, p. 18

319834411.4

EXHIBIT 15 – CLAIM CHART FOR U.S. PATENT 9,667,337

portable devices, and		
[29G] wherein said controller is configured or configurable to perform or for performing at least one of: a) ignore or filter out at least some signal or data transmissions from one or more undesired transmitters, users, networks, data sources, or noise sources; and b) instruct one or more devices or networks to ignore or disregard at least some signal or data transmissions of one or more	See claim element [1H] above.	See claim element [1H] above.

EXHIBIT 15 – CLAIM CHART FOR U.S. PATENT 9,667,337

undesired transmitters, undesired users, undesired networks, or noise sources.		

Ex. 15, p. 20